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Original Paper

Exploring the High-quality Development Path of Academic Libraries in the Perspective of Digital Literacy

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Abstract

In the new era, academic libraries are shouldering new missions and responsibilities for the progress of science and technology. Exploring the issues related to the high-quality development of academic libraries will play a crucial role in fully implementing the strategic planning to develop future academic libraries and to enhance their value and influence. In the digital intelligence era, digital literacy education has become a new growth point of the library's social education function. This paper explains the connotation of digital literacy and the components of high-quality development of libraries. On basis of the problems and solution strategies of college libraries existing in the construction of talent teams and resources, the path of high-quality development of college libraries is rationally designed in the current paper. It is believed that digital literacy would empower the high-quality development of college libraries and significantly promote the construction of smart libraries.

Keywords

digital literacy, academic library, digital resources, high-quality development

1. Introduction

Driven by the digital education strategy, modern information technologies such as cloud computing, big data, and artificial intelligence are increasingly emerging as new engines for the development of scientific and technological innovation in universities. As a crucial support for academic research in universities, libraries are facing new opportunities and challenges. They are transitioning from traditional service-oriented libraries to more efficient and intelligent smart libraries, aiming to achieve high-quality development. The intelligent transformation of University Library inevitably puts forward higher requirements for professional librarians' digital literacy skills, digital resources and the configuration of modern intelligent infrastructure.

2. Literature Review

2.1 Digital Literacy

The concept of literacy has evolved alongside technological advancements, resulting in a proliferation of related concepts in the literature. But it still faces the problems of ambiguous concepts, unclear definitions, and easily being misunderstood (Feerrar, 2019). Additionally, a wide variety of synonyms and the related concepts exist, including technology literacy, computer literacy, IT literacy, media literacy, academic literacy, information literacy, critical literacy, and communications literacy. These complexity and ambiguity severely hinder precise measurement and operationalization, thereby impeding the scientific research (Gong & Ribiere, 2021).

The original definition of digital literacy was formally proposed by Gilster (1997), who defined it as "the ability to understand and use information from computers in various formats". In 2018, the United Nations Educational, Scientific, and Cultural Organization released the Digital Literacy Global Framework (DLGF). The DLGF clearly defines digital literacy as the ability to securely and appropriately acquire, manage, understand, integrate, present, evaluate and create information using digital technology, aiming for employment, decent work and entrepreneurship. This encompasses computer literacy, ICT literacy, information literacy and media literacy. In 2021, the "Action Plan for Improving Digital Literacy and Skills for All" issued by the Cyberspace Administration of China further clarified the concept of digital literacy, which refers to a collection of a series of qualities and abilities. Specifically, the digital society citizens should possess in their learning, working and living, including digital acquisition, production, use, evaluation, interaction, sharing, innovation, security, ethics and morality. In practice, Wang (2023) compiled and analyzed the development of four versions of the European Union (EU) Digital Literacy Framework. The DigCom 2.2 model contains a comprehensive update of the knowledge and skills related to digital literacy in five areas: information and data literacy, communication and cooperation, digital content creation, security and problem-solving. Weninger (2023) argued that the predominant focus on Digital Literacy skills overlooks its broader implications, advocating for Digital Literacy to be developed as a social practice. Furthermore, digital literacy is characterized by its evolving nature, and closely tied to the technological advancements. The development and introduction of new artificial intelligence tools have introduced new demands on Digital Literacy as well as the corresponding digital skills and competencies (Vasilescu et al., 2020).

In summary, with the rapid advancements in the Internet, cloud computing, big data and artificial intelligence, the concept of digital literacy has gradually expanded and been refined, evolving from a basic understanding to a deeper comprehension. It exhibits notable characteristics of dynamism, comprehensiveness and openness. As new technologies emerge, the related content will be continuously enriched, significantly deepening the essence of digital literacy.

2.2 Digital Literacy Education

Nowadays, digital literacy has a big impact on people's lives, careers and social standing. Digital literacy is essential for those people who want to take advantage of educational opportunities, find work, and succeed in their careers. In the United States, the National Skills Alliance reports that 92% of jobs require digital skills. Besides, researches indicate that the enhancement of digital literacy skills can significantly improve China's rural economy and bridge the wealth gap (Zhang et al., 2024). Most recently, Liu (2024) and others declared that, with digital literacy education emerging as a new focal point of the library's social education function, the social education function of libraries has evolved from primarily focusing on education to literacy education. Evidently, in the digital intelligence era, academic libraries are clearly responsible to develop digital talent with a creative mindset and useful skills for the country, thereby offering strong talent support for the growth of China's digital economy.

3. The Constituent Elements of High-quality Development in University Libraries

3.1 Problems of Building Digital Service Teams in College Libraries

With the development of artificial intelligence and big data technology, traditional libraries are gradually evolving into smart libraries, while the construction of a professional digital service librarian team has not received adequate attention. First, the demand for digital librarians in Chinese universities significantly outstrips the supply, and this imbalance has become a crucial factor limiting the high-quality development of smart libraries in universities. Second, the allocation and selection of librarians lack scientific rigor. Finally, there is a lack of foresight in the training and capacity building of digital librarians. The government, educational administrative departments and Library Associations all lack relevant framework guidelines for digital literacy education and training. As a result, most university libraries stick to the traditional thinking of information literacy education, do bear unclear positioning of digital literacy education, and imperfect practice mechanism, and lack the corresponding resources and equipment.

3.2 Solution Strategies for the Construction of Digital Librarian Team

(1) Enhancing the high-level planning. In order to recruit librarians with digital knowledge, experience, and skills and to play a leading role, the library's decision-making group formulates strategic plans for development. Meanwhile, the library should implement training programs and incentive mechanisms that encourage librarians to advance their digital literacy and build a team of digital librarians with a high level of professional identity and subjective initiative. The development of librarians' digital literacy skills can benefit teaching and learning as a digital literacy lecturer and student information tutor. As a consequence, it can support scientific research as a scientific research partner and also help the university decision-making think-tank formulate the strategic planning of library development.

(2) Optimizing the digital infrastructure. True knowledge can only be produced by practice, and librarians cannot cook without rice. Modern and intelligent equipments can better support and facilitate the growth of teachers and students. Moreover, librarians should foster and train the development and implementation of new systems and procedures. In turn, system development and equipment procurement practically need a certain amount of funding and technical supports much beyond the library, and the human and material resources should be allocated for effective performance.

(3) Recruiting the high-level specialized personnel, cultivating comprehensive compound talents, and strengthening the construction of professional talent team. The iron triangle model should be constructed with professional data librarians acting as supervisors for the data and visualization services. Diversified training should be employed to enhance the data literacy of librarians, with faculty, students, database vendors and other subjects also being included in this initiative. Graded openings for data literacy training courses should be established for librarians, with diversified training models being utilized to enhance the digital literacy of librarians. Training in common database retrieval and common data processing should also be provided to librarians. Additionally, training in crawlers and visualization tools should be made available. At the same time, it is aimed at the temporary service assistants of teachers and students in the whole school, guided by user needs, and further improves the ability of digital services. The construction of digital librarians in colleges and universities requires a compound cross-knowledge structure. They should not only master the basic application and equipment skills of digital technology, but also maintain their sensitivity to new technologies, keep abreast of industry trends, and constantly update their knowledge and skills training.

3.3 The Construction of Digital Resources in University Libraries from the Perspective of Digital Literacy

Academic libraries have rich information resources, and are important places for cultural dissemination. Their collections can be categorized into two types: print resources and digital resources. In the 21st century, the global economy is struggling, which has led to shrinking budgets for college libraries. Meanwhile, the demand for digital resources among contemporary readers is rapidly increasing. This has created a noticeable conflict between print and digital resources in libraries. Currently, academic libraries allocate more than 60% of their acquisition budgets for documentary resources to electronic formats. To align with this trend, college libraries need to focus on developing their digital resources. However, they face significant challenges in this endeavor.

(1) The slow progress of digital construction of self-built database: As each university library evolves alongside the institution itself, it generates unique resources that reflect its characteristics. Common resources include dissertations and library publications. For example, the East China University of Science and Technology Library features a special collection of chemical literature, while the Shanghai Normal University Library houses periodicals from the Republican era. Similarly, the Shanghai

University of Traditional Chinese Medicine Library offers a special collection of Traditional Chinese Medicine literature. Limited by human, material and financial resources, it is difficult for university libraries to build their own characteristic resource library digitalization. In today's world, where digital technology is highly developed, there is a rare chance for these self-built collections to be digitized and made more accessible.

(2) Outdated digital resource management system, poor user experience: When resources are fully digitised, the resource management system is particularly important in order to make them smoothly open for use by users. The resources cannot achieve one-stop search, and users need to log in different interfaces to find them.

(3) The awareness of digital resource sharing requires enhancement, and the formats of literature resources lack uniform standards. Digital resource sharing transcends time and space limitations, allowing anyone to access library information resources, which helps avoid duplication in college libraries and saves manpower, materials, and finances. However, many college administrators still resist common sharing practices. Additionally, the absence of standardized processing for documentary resources leads to varied formats across universities, hindering effective co-construction and sharing. Simultaneously, the challenge of sharing digital information resources extends beyond library management responsibilities; staff must also possess technical skills and be familiar with digital tools. Only librarians with strong digital literacy can promptly address error messages during co-construction and resolve issues that arise in subsequent work.

(4) The gap between the rapid advancement of technology and the slow digital transformation of libraries presents a challenge. With the advent of the digital age, the development of artificial intelligence is a new issue that libraries have to face. It is essential to move beyond merely utilizing digital resources; instead, libraries should employ appropriate tools that enable real-time computing based on user needs. This approach aims to maximize resource usage while balancing resource collection and utilization, thereby enhancing their value. Additionally, deeper data exploration is necessary to improve data storage and management effectiveness.

4. The High-quality Development Path of University Libraries

4.1 The Development Path of Digital Literacy Ability of University Librarians

Under the environment of artificial intelligence, the emerging information technology has created the continuous change of the library. The library has moved from the traditional library, the digital library and the library form to the intelligent library. The professional ability of the library has gradually evolved from participating in edge projects to design into the development process of AI application core. The professional ability of university librarians has advanced from simple data collection and preservation to mastering the professional knowledge of copyright and data security, training users to

use software tools and acquire content to data science and coding ability development. Librarians' digital literacy ability is the decisive factor for the development of university libraries, which requires university libraries to explore its development path.

(1) Establishing a Long-term Training Mechanism: Enhancing librarians' digital literacy requires a sustainable training framework. Library associations should create theoretical standards for digital literacy training to guide library development. Additionally, specialized teaching materials must be developed to improve librarians' knowledge and theoretical understanding. Decision-makers in universities and libraries should focus on top-level planning by defining clear training pathways, establishing tiered courses, and creating diverse models for digital literacy training that cover both foundational theory and practical skills.

(2) Establishing a Robust Incentive Mechanism: Digital librarians have significant responsibilities and workloads. Libraries need to implement various incentive strategies tailored for these professionals to foster enthusiasm and creativity while aligning their actions with the library's goals. A well-designed incentive framework can enhance digital librarians' sense of identity within the organization, strengthening cohesion and encouraging self-driven value creation—ultimately supporting the library's digital transformation efforts.

(3) Establishing and improving the assessment mechanism: a scientific assessment mechanism helps to carry out high-quality services. The library should formulate a detailed assessment framework, formulate a targeted assessment index system that meets the development needs, including performance indicators such as job output quantification and service evaluation, and clarify the weight and scoring criteria of each indicator. Through employee self-assessment, colleague evaluation, superior evaluation, customer feedback and other ways to collect assessment data, reduce subjective impact, and help digital librarians understand their own advantages and disadvantages. Through the implementation of scientific, fair and effective assessment mechanism to form a good working and competitive atmosphere, enhance the loyalty of digital librarians to the post, so as to more actively participate in scientific research services.

4.2 Pathways for Constructing Digital Resources in University Libraries

(1) Prominent characteristics and specialization: Accelerating the digitalization of collection resources. Maximizing the enabling potential of information technology and artificial intelligence to address technical challenges in constructing digital resources. This will facilitate the digitization of library collections, allowing readers to access online retrieval and borrowing services easily. By leveraging internet technologies, libraries can develop unique resource offerings that are distinct from others—ensuring comprehensive availability, highlighting resource characteristics, enhancing service quality, and nurturing exceptional talent—and even small university libraries can cultivate their areas of expertise.

(2) Strengthening the construction of standards and norms for digital resource libraries to achieve collaborative development and sharing.

Establishing standardized specifications is crucial for building a robust digital resource library. Unified standards ensure interoperability and sustainability throughout the service lifecycle, forming a foundational element for collaborative development and sharing initiatives. Resource sharing significantly enriches libraries' digital assets while addressing diverse reader needs effectively. However, China's current system for co-construction and sharing faces challenges such as loose organizational structures, inadequate funding, insufficient infrastructure, and limited personnel capacity—all hindering its ability to meet contemporary demands for digital resource development. Given these issues, China should strengthen collaboration in constructing and sharing digital resources.

(3) Strengthen the construction of a unified platform for digital resources and enhance access to literature resources:

In response to the economic downturn, tighter university budgets, and rising database costs, many universities are working to ease financial pressures by reducing reliance on commercial databases. They are integrating various knowledge sources within existing legal frameworks, including freely available online resources, open-access materials, specialized content aligned with institutional development, regional cultural assets, and master's and doctoral dissertations from their own institutions.

Currently, China's literature information resource-sharing service platform has limited literature included. Each platform operates independently without a cohesive national retrieval system that meets users' real-time needs; this results in low utilization rates of collaborative literature resource platforms. Therefore, it is recommended that national investment focus on establishing a unified digital resource platform led by the Ministry of Education in partnership with major university libraries. This initiative aims for centralized management and coordinated development of shared literature resources through a national digital service platform that enhances strategic access to literary materials at the national level.

5. Conclusion

In summary, college libraries are the foundation of campus informatization. They are becoming a composite space integrating a literature information center, an independent learning center, a research and communication center, a cultural education center, and a knowledge innovation center. With the advent of big data, massive data make the informationization work of academic libraries severely challenging in all aspects. The high-quality development path of academic libraries should closely surround the two core tasks of talent team and resource construction. On the one hand, libraries should create a comprehensive composite librarian team with good digital literacy. On the other hand, libraries should vigorously strengthen the construction of digital resources, the transformation and development

of libraries to digital intelligence, and the transition from a physical venue to an all-encompassing space that rationally combines a composite library, digital library, and virtual library.

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